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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume X | AUGUST, 1937 | No. 7

New Chapter of A.S.M. Formed Near Chicago

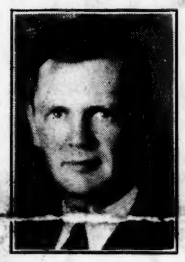
Calumet Chapter Embraces Gary, Hammond, East Chicago and Other Steel Towns

Serving one of the hugest industrial areas in the country, the Calumet Chapter of the American Society for Metals has recently been organized.

This is the area along Lake Michigan from the southern part of Chicago through Gary, where large amounts of steel, castings, forgings and other metal products are made.

H. B. Wishart

The members living in this district previously attended meetings of the Chicago Chapter, but with the rapid expansion of that group, it was decided that social and educational purposes would be better served by the organization of a separate chapter.



James Halley

O. W. McMullan

A charter was duly granted, and on May 18 a meeting was held and officers elected. The first regular meeting will be held on Sept. 2.

The Chapter at present numbers 80 members. Officers are as follows:

H. B. Wishart, Metallurgical Laboratory, Carnegie-Illinois Steel Corp., Gary, Ind. — *Chairman.*

J. W. Halley, metallurgist, Inland Steel Co., Chicago — *Vice-Chairman.*

O. W. McMullan, Youngstown Sheet & Tube Co., East Chicago, Ind. — *Secretary-Treasurer.*

Nominations for A. S. M. Officers Are Now Closed

The nominations of George B. Waterhouse as president of the American Society for Metals, W. P. Woodside as vice-president, Bradley Stoughton as treasurer, and J. P. Gill and H. A. Anderson as trustees have been completed.

Inasmuch as no additional nominations for the various offices which were vacant were received at the national office of the Society by July 15, nominations have been closed.

In accordance with the requirements of the Constitution of the Society, the Secretary will cast a unanimous vote for the offices specified at the annual meeting in Atlantic City, to be held on Wednesday morning, Oct. 20, in the Renaissance Room of the Ambassador Hotel.

A. S. M. Annual Meeting

To the Members of the A.S.M.:

This is your official notice that the annual meeting of the American Society for Metals will be held in the Renaissance Room of the Ambassador Hotel, Atlantic City, N. J., on Wednesday morning, Oct. 20, 1937. All members of the Society in good standing are privileged to attend and vote.

W. H. Eisenman, Secretary.
Cleveland, Ohio, August 15, 1937

Texas Starts Course With Lecture on Ore Mining and Pig Iron

By Charles F. Lewis

Texas Chapter, in line with its educational program, held its first meeting in the lecture course on June 3 at the Chamber of Commerce Auditorium, Houston, Texas. This meeting covered the mining of ore and the making of pig iron in the blast furnace.

The lecture was based on Keller's "Lectures on Steel and Its Treatment" and was supplemented by motion pictures, "The Story of Iron" being shown through the courtesy of Bethlehem Steel Corp. At an appropriate spot a short reel was inserted, giving an animated picture of what actually takes place inside a blast furnace.

The speaker was Robert M. Hutchison, chief engineer of the Houston Natural Gas Co. Mr. Hutchison spent his early professional life as assistant superintendent of blast furnaces at what is now the Sparrows Point plant of the Bethlehem Steel Corp.

Blast Furnace Practice Outlined

He graphically outlined the many practical points that must be watched for the successful operation of a blast furnace. The effects of too hot or too cold a furnace, too lean or limey a mix were given, along with the steps necessary to correct these conditions.

The chemistry involved was sketched, and the various types of charging apparatus, and the importance of getting the proper quantities and distribution of the charge were discussed.

Mr. Hutchison's avocation is the writing of poetry, and the poem printed elsewhere in this issue is one that he composed especially for this meeting.

Following Mr. Hutchison's talk, Vice-Chairman Charlie Shapiro gave an outline of the early history of the discovery of iron, and the various historical steps that have made it the most important material in our world of today.

It is to be the policy of the Educational Committee of the Texas Chapter to use motion pictures to the utmost in supplementing the speakers' offerings on the various subjects.

Being a new chapter, it is necessary to start at the beginning, and cover each phase of the steel business in turn. Keller's lectures on "Steel and its Treatment" are being used as an outline or guide, and each lesson is to be enlarged upon by a competent speaker. By this means the membership will be brought to the point where the highly technical speakers from up East can be easily understood, and a groundwork laid for future meetings on specific subjects.

On the Board Walk

Photo by H. H. Harris

Both the Ambassador Hotel, A. S. M. Headquarters for the National Metal Congress, and the Auditorium, site of the National Metal Exposition, Face the Famous Board Walk and Beach in Atlantic City.

Compliments

To A.S.M. President Edgar C. Bain, who received the Lamme Medal for excellence in engineering from his alma mater, Ohio State University, at the commencement in June.

-*-

To George B. Waterhouse, president-elect A.S.M., professor of metallurgy, Massachusetts Institute of Technology, on receiving the degree of Doctor of Metallurgy from his alma mater, the University of Sheffield, England.

-*-

To Benjamin F. Fairless, 47, energetic president, Carnegie-Illinois Steel Corp., upon receiving the degree of Doctor of Engineering from Kent State University, Kent, Ohio, on June 11.

-*-

To R. E. Zimmerman, vice-president in charge of metallurgy and research, United States Steel Corp., on his recent visit to Germany, France and England

-*-

To the Lamson & Sessions Co., Cleveland, on having six employees who have served the company for more than 50 years and seven whose service records range from 42 to 49 years.

-*-

To Herbert L. Whittemore, chief, Engineering Mechanics Section, National Bureau of Standards, Washington, on being awarded the Edward Longstreth Medal of the Franklin Institute.

-*-

To Rupen Eksergian, Edward G. Budd Mfg. Co., Philadelphia, on being awarded the George R. Henderson Medal of the Franklin Institute.

Cook Lectures Drawing Card For Convention

Series of Five Lectures on Open Hearth to Be Given at Metal Congress in October

"As each of Earnshaw Cook's successive lectures in the course on 'The Open Hearth' to be presented in October at the National Metal Congress in Atlantic City, comes in, I am more and more convinced that his lively handling of the subject is going to be of great interest to experienced operating men, as well as to the novices."

So said Reid L. Kenyon, chairman of the Educational Lecture Committee, Board of Trustees, A.S.M., in discussing the technical program to be presented during the Congress.

"This series of lectures should prove a strong drawing card to increase the attendance at the National Metal Congress among a group of men who have not attended in such large numbers in previous years," Mr. Kenyon continued.

A shorter evening course on "Metallographic Technique," to be presented by J. R. Vilella, United States Steel Corp. Research Laboratories, should be of intense interest to laboratory workers and research men.

These lectures will supplement the regular technical sessions which will be held each morning and afternoon during the five days of the Congress. An important feature of these technical sessions will be a two-day symposium on "Carburizing."

Preprints of the papers will be available at no charge to members of the Society about September 15. Orders may be sent in now, however, using the list of titles on page 4.

Technical sessions will be given on the second floor of the Auditorium, which will house the National Metal Exposition held in conjunction with the Congress.

Headquarters for the American Society for Metals are at the Ambassador Hotel. See page 12 for other hotel headquarters and reservation blank.

Canadian Chapters Plan Luncheon for Convention

The Canadian Chapters of the American Society for Metals plan to hold an informal luncheon during the National Metal Congress and Exposition at Atlantic City in October.

The luncheon will be held at the Ambassador Hotel, headquarters for the A.S.M., on Tuesday, Oct. 19, at 12:30.

The first Canadian luncheon was held last year at the Annual Convention, by the Ontario and Montreal Chapters, and was such a success that the event is to be repeated this year.

Preprints of papers for the National Metal Congress are listed on page 4 and may be ordered now.

Hotel reservations should also be sent in early. See page 12 for room rates and reservation blank.

THE REVIEW

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American Society for Metals

7016 Euclid Ave., Cleveland, O.

E. C. BAIN, *President*
G. B. WATERHOUSE, *Vice-President*
W. H. EISENMAN, *Secretary*
W. P. WOODSIDE, *Treasurer*
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R. L. WILSON — R. L. KENYON
S. C. SPALDING

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

Cleveland, O., August, 1937
Volume X — No. 7

Gleanings . . .

. . . from the chapters

Greetings, Calumet . . .

The spring of the year brought forth another new chapter, which expects to get going at full speed with it first meeting on Sept. 2. Its name is Calumet and it serves the towns of Gary, East Chicago, Hammond, and others along the Lake Michigan shore—metallurgists' meat, all.

Nurtured under the wing of the capable and experienced Chicago Chapter, its growth should be rapid and successful.

Guess Who? . . .

Will the member whose new address is 592 South Ogden St., Denver, Colo., please send his name to the National Office so that the address change can be made?

Versatile Texan . . .

THE REVIEW is seriously considering inaugurating a literary corner for such talented members as R. M. Hutchison. Not only does he lecture to the Texas Chapter and act as chief engineer of Houston Natural Gas Co., but also composes poems in his spare time (see opposite page).

Another candidate would be G. M. Enos, whose Metallurgical Alphabet was published last April.

Shades of the Past . . .

We hope no serious shocks will be suffered by members who find their 1922 faces on pages 7 and 8. And don't be surprised if you don't recognize yourself by the keyed identifications. We may be wrong!

Speaking of Photographs . . .

Detroit should have some fine specimens for posterity, judging from the activities of "Official Photographer" Herzig at the Annual Outing.

We can't speak so well of the activities of Gordon Webb, but are inclined to excuse him on the somewhat flimsy grounds that he may have been rehearsing for the famed Gilbert and Sullivan role of Lord High Executioner.

Play Ball . . .

A feature of many A.S.M. chapter picnics is a baseball game, and a peculiar thing that has come to our attention is the frequency with which these games end in a tie—*i.e.* New Haven Executives versus Ansonia Farrel Foundry men, 17 to 17; Rhode Island C.O.I. versus R.I. A.L. of F., 27 to 27. Either the chapter reporters are spoofing us or peace must be kept within the ranks!

Milwaukeeans Visit Carnegie-Illinois

Members of Milwaukee Chapter Photographed at Plant Inspection.

Inspect Electric Furnaces, Rolling Mills, Open Hearth

By G. K. Dreher

Milwaukee Chapter—About 125 members of the Chapter under the leadership of E. Guenther journeyed to Chicago on Saturday, May 22, on a special North Shore train for an inspection trip to the South Works of the Carnegie-Illinois Steel Corp.

H. J. Mullen of the Milwaukee office of the Corporation arranged the trip in collaboration with H. Henderson of the Chicago offices. H. A. Morrison and J. W. Elliott of Milwaukee, together with Metallurgists J. Housten, E. W. Eckersall, T. Hayes and G. Lowe formed the escorting Corporation hosts. The departments visited included the 20-ton alloy electric furnace division, the alloy rod mill, the continuous 69-in. plate mill, the wide flange beam mill, the open hearth floor and the blast furnace division.

Web-Footed Golfers Splash at Rainy Cleveland Outing

By H. D. Churchill

Cleveland Chapter—In spite of lowering skies all morning and pouring rain all afternoon, Cleveland members showed their loyalty by a large turnout at the annual outing held at Sleepy Hollow Country Club on June 10.

During the afternoon the golf tournament called out a hundred webfooted devotees who splashed and swam around the course for eighteen holes to turn in some very creditable scores, Emil Dudeck as usual holding low gross.

The baseball and horseshoe contests were eliminated by the weather, but the pingpong tournament was run off in the club house and was featured by the dethronement of champion Van Horn by up-and-coming Junior Member "Chuck" Burrows.

Entertainment during dinner was furnished by Carl Monaghan of the Manufacturers Supply Co. and his quartet.

Afterwards Robert H. Perry, chairman of the Outing Committee, presented some 85 prizes for the various events, donated by friends of the Chapter.

The dining-room was cleared and a very interesting talking movie on golf was presented.

In spite of the inclement weather every one seemed to have an excellent time, and the Chapter is greatly indebted to its Outing Committee, headed by R. H. Perry and consisting of A. T. Code, C. P. Critzer, G. J. Hales, J. E. Jackson, R. E. Kerslake, and W. O. Kurtz.

Golf, Baseball and Horseshoes Feature New Haven Program

By D. F. Sawtelle

New Haven Chapter—The golf enthusiasts at the annual outing held on June 5 at Eichner's Grove, Trumbull, Conn., started early in the morning. At noon, however, the aroma of liver and bacon, Virginia ham, and Prauger ham sandwiches (not to mention beer) wafted from a grove some miles away where luncheon was being served threw them off their game, and they, too, joined the main festivities.

By early afternoon games of baseball and horseshoes were in full swing. The big ball game of the day was between men of the Ansonia-Farrel Foundry and the executives of the Chapter.

This ended in a tie score of 17 to 17 in the last inning. (The executives, of course, would have won easily if Henry Keshian had played with them, but he could not be persuaded to leave the finals of the horseshoe tournament!)

By late afternoon the mellow beer and mellow voices worked and overworked all the old songs while waiting for the last few minutes of the heat treatment of the Texas steer which had been going on since early morning. The dinner was served in barbecue style with all the fixings, after which the drawings for prizes were held.

Address Changes!

If you have moved, please send your change of address promptly to the National Office, and thus avoid any delay in receipt of your publications.

It is important to include your old address as well as the new. If you are moving out of the city, please designate whether or not you wish to change your chapter affiliation.

Contour Sawing Described In New 107-Page Handbook

Contour sawing and filing, a new technique applied to the shaping of metals, is the subject of a 107-page handbook published by the Engineering and Research Department of Continental Machine Specialties Co., 1301 Washington Ave., S., Minneapolis.

The "Doall" machine permits band saws and band files to be used interchangeably, and provides saws as narrow as 1/16 in.

The book describes the applications of the tool to operations usually done by shapers, nibblers, lathes, milling machines, and cutting torches, and includes a price list.

DO YOU KNOW

THAT

● THAT . . . the rare metal indium is softer than lead, lighter than zinc, more lustrous than silver, as untarnishable as gold?

● THAT . . . the amount of steel in use in the United States totals a billion tons? Enough to encircle the globe with a bracelet 10 ft. high and 3½ ft. thick, or enough to build 17,544 more Empire State Buildings.

● THAT . . . folding stainless steel anchors have been introduced for yachts and flying ships which, for equal holding power, weigh only ⅛ as much as the standard kedge type? The only trouble is they dont *look* like an anchor.

● THAT . . . "Gunk" is the name of a cleaner to remove grease from aluminum? And here we always thought it was something to eat!

● THAT . . . $20,000,000 worth of pennies could be made from the 13,500,000 lb. of copper required for the conductor tubing used in the Boulder Dam-Los Angeles power transmission lines? But if you had them, you'd need a good sized building to store them in.

● THAT . . . 345 tons of hardware, chiefly nuts and bolts, have been ordered for use in the construction of the 1939 Golden Gate International Exposition in San Francisco Bay? The average hardware dealer would have to hire a couple of extra helpers to fill that order!

● THAT . . . the number of exhibitors who have reserved space at the National Metal Exposition in Atlantic City next October is already more than double the total number of exhibitors at the convention held in Buffalo five years ago? The amount of exhibit space sold is expected to triple that of 1932.

Discussion Centers Around Permanent Magnet Steel Alnico

New York Chapter—In discussing permanent magnet steel, A. A. Hassan, metallurgist, Atha Works, Crucible Steel Co. of America, Harrison, N. J., speaking at the meeting on May 17, reviewed briefly the carbon steels such as the tungsten and the chromium magnet steels, as well as the cobalt alloy magnet steels.

His chief discussion embraced the newer steels for magnets, namely the aluminum-nickel and the aluminum-nickel-cobalt steels, known as "Alnico." The modifications of this base steel by addition of molybdenum, copper and so on were also discussed.

In the manufacture of the Alnico magnet steel the raw materials are melted in an Ajax high frequency induction furnace and the alloy is poured into dry or green sand molds; all the products are made as castings.

The resulting alloy is usually hard and sometimes non-machinable. Grinding is necessary to finish the product to correct shape.

Many of the Alnico permanent magnet steels are now used in the radio industry, the telephone industry and in magnetos. They are usually sold by the piece rather than by the pound. They are usually small, for a greater effectiveness results from the Alnico type and hence less mass is necessary.

The Crucible Steel Co. is one of the largest producers of permanent magnet steels in the country and manufactures Alnico under a license of the General Electric Co., which owns the patents.

Krivobok Gives New Ideas of Metal Structure

Urges Necessity for Study and Classification of Inherent Properties of Crystals

Rochester Chapter — The annual meeting of the Chapter was held at University of Rochester, on May 10.

Following the election of officers the meeting was addressed by V. N. Krivobok, associate director of research, Allegheny Steel Co., on the subject "Structure of Metals." The Chapter was indeed fortunate in having as a speaker such an outstanding authority in this field of metallurgy.

Dr. Krivobok introduced his subject with the remark that the study of the inner structures of metals began when we started to work with X-rays.

He then proceeded to explain the modern theories concerning the nature of solid metals. Metals and alloys are made up of crystals. These crystals, such as we know them today, are in all respects perfect crystals and consequently behave in a very definite and characteristic manner.

Structure Influences Properties

We know that with certain types of crystal structure we can expect certain general properties; for example, crystals of one type of atomic structure will display a marked ductility, while crystals of a different atomic structure will be endowed with ductility to a much lesser degree.

It is therefore an urgent necessity that the study and classification of crystals' inherent properties should be insistently pursued.

Dr. Krivobok described various types of atomic arrangements in metals and suggested that the most common ones are the body-centered cubic, face-centered cubic and hexagonal close-packed atomic structures. These are not only the most common but also the most simple.

Some metals have a much more complex structure, often with a large number of atoms in a unit cell, as, for example manganese. Often we have observed that the more complex the metal or alloy, the more pronounced are its physical characteristics such as, for example, brittleness and hardness.

Super-Lattices a New Study

Although the study of properties and characteristics of the metals can be followed in a general way through the study of the atomic arrangements, we find several instances when the present-day knowledge of atomic structures does not allow us to explain certain experimentally observed phenomena.

It was therefore necessary to search for additional factors and Dr. Krivobok then explained the meaning and possible influence of the super-lattices as found in some alloys. The study of super-lattices and other possibilities is in its infancy and a great deal of work is yet to be done.

The lecture was accompanied by the experimental observation properly pertaining to the theoretical topics under discussion.

Dr. Krivobok is to be congratulated on his splendid presentation of this topic, and the members left the meeting convinced that it is possible to make a very dry subject very interesting.

WANTED!

Used Rockwell hardness testing machine.

Address Box 8-2

AMERICAN SOCIETY FOR METALS
7016 Euclid Ave. Cleveland, Ohio

Rhode Islanders Are Sated With Favorite Dish at June Outing

By Walter M. Saunders, Jr.

Rhode Island Chapter—June 19 was a wet day when members and guests gathered at the South Seekonk Gun Club for the annual Clam Bake and Field Day. However, the afternoon's events were highly successful.

The highlight was a fast baseball game between a team representing the C. O. I., and one representing the A. L. of F. Very appropriately, both teams were captained by outside organizers, namely Big Ed Richardson, of Mansfield, for the C. O. I., and Honest Tom Breen, of Boston, for the A. L. of F.

Both teams proved capable mudders and by the time the third inning rolled around, the score was deadlocked 27-27. The game had to be discontinued then to proceed with the snappy floor show, and the Rhode Island Clam Bake, which followed. It does not seem necessary to describe the first, and while the second would form a lengthy paper on heat treating for the TRANSACTIONS, no attempt will be made here.

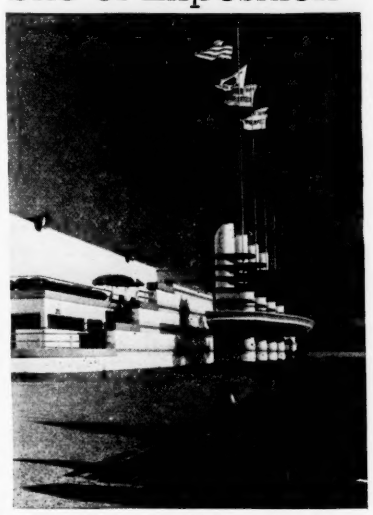
Merle Caruthers was the able M. C. of the Outing, and also successfully led the singing and supervised numerous games of skill, vulgarly known as Penny Ante.

Bob Ashman handled the ticket situation admirably, but is still trying to account for the 150 dinners eaten, with only 135 present.

Door prizes generously donated by various firms were distributed, but the large baseball trophy in competition for several years could not be awarded because neither team staged a sit-down.

The Chapter hopes in the future to be honored with the presence at the annual Clam Bake of A.S.M. members far from the shores of Rhode Island. When they taste the succulent bivalves, heat treated at a temperature of "cigar" cone, 7-24, they will find the food they have always been looking for, but never quite approached.

Site of Exposition



The New and Modern Pan-Pacific Auditorium in Los Angeles Will Make an Unusual Setting for the Western Metal Show.

New Bulletin Describes Water Sand Blast Cleaning

The Hydro-Blast Corp., 111 W. Washington St., Chicago, has issued Bulletin No. 102 on "The Hydro-Blast Wet Sand Cleaning Method."

Installations, operation, and engineering data on this new labor-saving method of water-sand blast cleaning of castings are shown. Time studies on the cleaning of various types of castings should be of decided interest to foundrymen making steel and large gray iron castings.

Detroit Rex Opens New Office

The Detroit Rex Products Co. of Detroit, manufacturers of Detrex Degreasing machines, Perm-A-Clor and Triad Solvents, and Triad Alkali Cleaners and Strippers, announces the opening of a new branch office located at 812 Huron Road, Cleveland.

Western Show To Be Held in Pan-Pacific Hall

$10,000 Worth of Exhibit Space Already Reserved for Exposition in Los Angeles

Over $10,000 worth of exhibit space has already been reserved for the Western Metal Exposition to be held in Los Angeles March 21 to 25, 1938. The beautiful and modern Pan-Pacific Auditorium, which has on one level over 100,000 sq. ft. of floor space, will house the exhibits.

The Western Metal Congress, to be held in conjunction with the Exposition, will have as its general theme "Metals in Industry." Papers and discussions will be held on the subjects of aviation, the oil industry, chemical industry, mining, and general manufacturing.

Headquarters for the Congress will be the Los Angeles-Biltmore Hotel.

John Disario, metallurgist, Columbia Steel Co., Torrance, Calif., is chairman of the General Committee for the Western Metal Congress and Exposition; George Stetter, Pacific Coast Steel Corp., Vernon, Calif., is vice-chairman, and E. C. Black, Tool Steels, Inc., Los Angeles, is secretary. Other committee chairmen are as follows:

Exhibit Chairman—A. G. Zima, International Nickel Co., 714 W. Olympic Ave., Los Angeles.

Exhibit Vice-Chairman—James H. Knapp, James H. Knapp Co., 4920 Loma Vista Ave., Los Angeles.

Program Chairman—D. S. Clark, California Institute of Technology, Pasadena.

Publicity Chairman—W. A. De Ridder, General Metals Co., 5701 S. Boyle Ave., Los Angeles.

Transportation and Plant Inspection Chairman—J. O. Kilian, A. M. Castle Co., 2300 E. 55th St., Vernon.

Information and Registration Chairman—B. Reinhold, Abegg & Reinhold, 2533 E. 26th St., Los Angeles.

Entertainment Chairman—Harold P. Etter, Air Reduction Sales Co., Vernon.

Attendance Chairman—H. R. Abey, Leeds & Northrup Co., 4814 Loma Vista Ave., Los Angeles.

San Francisco Representative — James V. Coulter, Earle M. Jorgensen Co., 534 2nd St., Oakland, Calif.

189-Page Handbook on Vanadium Steels and Irons Is Ready for Distribution

"Vanadium Steels and Irons," a handbook of applied metallurgy, containing 189 pages, bound in flexible leatherette, illustrated with 71 photomicrographs and 178 charts and tables, has been published by the Vanadium Corp. of America, 420 Lexington Ave., New York.

This new metallurgical handbook is a complete review and reference source for the chemical composition, physical properties, heat treatment, recommended applications and fabricating procedure of all irons and steels in which vanadium is an alloying element.

The many charts and tables are based on latest authentic tests and analyses. Bibliographic references under each chapter head also include a great deal of new work.

Price of the volume is $1.25, but it is available without charge to executives and engineers actually engaged in using or specifying alloy steels and irons who request it on their business letterheads.

Pig Iron ~

A Poem Composed Expressly for Texas Chapter Meeting
By Robert M. Hutchison

Bob Service chose his subjects
From the frigid biting north.
And Kipling's tales of men and whales
From the tropics were brought forth.

The Great One, William Shakespeare,
Wrote poems, verse and plays
Of days of old when knights were bold
And castles rang with lays.

Charles Dickens penned his stories
When the world was thick with sin
And France was torn and her people worn
By the rage of battle's din.

But none of these great writers
Was ever allowed to see
A casting floor, where men's hopes soar
So the telling is left to me.

But my command of English
Will never call for a sob
So my attempt should be exempt
From jeers, by an angry mob.

There's romance in the steel game
It comes when the metal darts
But not the kind that leaves behind
A bevy of broken hearts.

Man finds it when he's working
With brain and muscle combined
For strength of will can bring the thrill
To give him his peace of mind.

The art of making iron
Is one for the best of men
For heat and grime and cold and lime
Are worse than a lion's den.

His mind and hands will weaken
Until he's about to fall;
And too much drag on heavy slag
Will slow his pace to a crawl.

But still he keeps on going
He isn't allowed to stop;
Orders say fill the blooming mill
The forges have to drop.

The Open Hearth needs metal,
The Bessemer is shut down,
The Rail Mill's through, nothing to do
And the gang's all gone to town.

So the call comes, More iron
For God's sake man, drive her hard;
We need the stuff, and that's no bluff
It has to come through the yard.

Or the whole works will suffer
And the big boss raises hell
So fill her up, the half starved pup
And be sure to drop the bell.

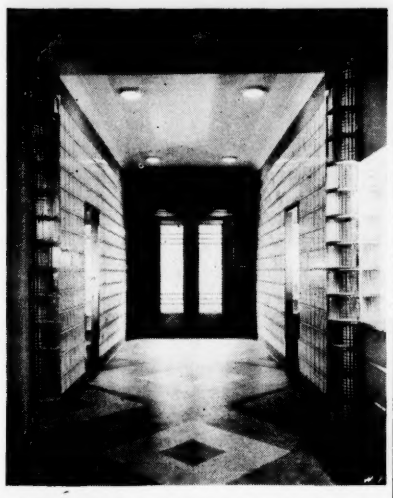
You have to produce more fodder;
We haven't a thing to do;
Make iron run, or get the gun
Because we depend on you

To keep the old mill running
Every day in the year,
Pile in coke, or the company's broke
And with it, you too, I fear.

Envoi

Oh! it's Pig, Pig, Pig
You, whinin, minin', muscle-bindin' Pig,
Though we heat you and brow-beat you
So the Open Hearth can eat you
You're the backbone of the Steel Mill
Iron Pig!

Firth-Sterling Opens New Plant for Manufacturing Sintered Carbide Materials



Glass Brick and Stainless Steel Doors and Trim in the Entrance Hall.

Beauty and Cleanliness Are Attained With Modern Materials and Construction

The new Firthite-Firthaloy plant of the Firth-Sterling Steel Co., McKeesport, Pa., is a modernistic building with a garden approach, in marked contrast to the drab steel mill and wire plant of the company, between which it is located.

The building has been designed to permit efficient and orderly production and the elimination of wasteful handling of materials and time losses.

The latest materials for industrial construction have been used — aluminum, glass, brick, stainless steel, cork, wood block flooring, Carrara glass walls. The best possible working conditions for the men and absolute cleanliness of the product are insured.

The building is to be used solely for the manufacture of sintered carbides, and its opening appropriately marks the tenth anniversary of the company's first experience with this form of metal.

New Dewaterer Designed For Small Dust Collectors

The new Schneible rectangular tank multi-louver dewaterer is made for use in smaller systems of multi-wash dust collectors where the quantity of water and sludge produced does not justify the use of the larger capacity truck type dewatering tank, or the still larger concrete rectangular tanks.

This unit is rectangular in shape and sits directly on the floor or on steel legs as conditions require. The tank is made with a divider down the center separating it into twin tanks for alternate use.

The design is simple and fool-proof. There are no moving parts, reducing breakage, wear and maintenance cost.

Descriptive literature is available from the Claude B. Schneible Co., 3951 Lawrence Ave., Chicago.

York Turns Back Clock of Time for One Afternoon

By A. Floyd Whalen

July 17, 1937, will occupy a fragrant section in the gardens of memory of all those 70 members and friends of York Chapter who journeyed out to Fischer's Woods on that day.

Many a forget-me-not was planted between the hours of 12 noon and 10 p.m., and none of them were indigo blue. Strange games involving wild deuces elbowed each other in the shady places, and panting ball-players floated away their thirsts many, many times.

This was the fifth annual picnic and its great success was due to Chairman Rudisil and the splendid squad of coworkers he picked to put the job over.

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AMERICAN SOCIETY FOR METALS
7016 Euclid Avenue, Cleveland, Ohio

PREPRINTS OF CONVENTION PAPERS

The following papers, scheduled for presentation before the 19th National Metal Congress in Atlantic City the week of Oct. 18, will be preprinted and will be ready for distribution about Sept. 15.

Any or all will be sent postpaid to members of the American Society for Metals upon request. Order by number according to list below.

1. **The Mechanism of Steel Hardening and Tempering as Indicated by Coercive Force Measurements**
   R. S. Dean, Bureau of Mines, Washington, and C. Y. Clayton, Missouri School of Mines and Metallurgy, Rolla, Mo.
2. **Effect of Tempering Quenched Hypereutectoid Steels on the Physical Properties and Microstructure**
   C. R. Austin and B. S. Norris, Pennsylvania State College, State College, Pa.
3. **Effect of Carbon on the Hardenability of High Purity Iron-Carbon Alloys**
   T. G. Digges, National Bureau of Standards, Washington
4. **Precipitation-Hardening of Cobalt Steel: A New Tool Material**
   R. H. Harrington, General Electric Co., Schenectady, N. Y.
5. **Quantitative Hardenability**
   J. L. Burns, T. L. Moore and R. S. Archer, Republic Steel Corp., Chicago
6. **A Note on Rapid Photomicrography**
   W. Mutchler and H. O. Willier, National Bureau of Standards, Washington
7. **Austenitic Grain Size of Eutectoid Steel**
   Harry Tobin and R. L. Kenyon, American Rolling Mill Co., Middletown, Ohio
8. **Electromagnetic Measurements and Steel Structures Correlated**
   Carl Kinsley, Consulting Engineer, New York City
9. **The Rupture Strength of Steels at Elevated Temperatures**
   A. E. White and C. L. Clark, University of Michigan, Ann Arbor, Michigan, and R. L. Wilson, Timken Roller Bearing Company, Canton, Ohio
10. **Relation of Size of Spheroids in Tool Steel to its Machinability and to Holding Edge of Cutter**
    D. E. Roda, International Business Machines Corp., Rochester, N. Y.
11. **A New Application for the Short-Time High Temperature Tensile Test**
    C. L. Clark, A. E. White and C. J. Guarnieri, University of Michigan, Ann Arbor, Mich.
12. **The Effect of Grain Size on the Oxidation of a Low Carbon Steel**
    C. A. Siebert and Clair Upthegrove, University of Michigan, Ann Arbor, Mich.
13. **Some Factors Influencing Austenitic Grain Size in High Purity Steels**
    G. Derge, Carnegie Institute of Technology, A. R. Kommel, United Engineering and Foundry Company, Vandergrift, Pa., and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh
14. **Relation of Pre-Treatment of Steels to Austenitic Grain Growth**
    J. E. Dorn and O. E. Harder, Battelle Memorial Institute
15. **The Effect of Mass Upon the Mechanical Properties of Cast Steel**
    C. W. Briggs and R. A. Gezelius, U. S. Naval Research Laboratories, Washington
16. **The Fatigue Resistance of Steel as Affected by Some Cleaning Methods**
    J. H. Frye, Jr., and G. L. Kehl, Lehigh University, Bethlehem, Pa.
17. **Influence of Heat Treatment on Creep of Carbon-Molybdenum and Chromium-Molybdenum-Silicon Steel**
    R. F. Miller, R. F. Campbell, R. H. Aborn, U. S. Steel Corp., Kearny, N. J., and E. C. Wright, National Tube Co., Pittsburgh
18. **The Initial Stages of Graphitization**
    H. A. Schwartz and M. K. Barnett, National Malleable and Steel Castings Co., Cleveland
19. **An X-Ray Study of the Ar_3 and Ac_3 Points of Iron and Iron-Nickel Alloys**
    Sidney D. Smith, Pennsylvania State College, State College, Pa.
20. **Graphitization in High Purity Iron-Carbon Alloys**
    Cyril Wells, Carnegie Institute of Technology, Pittsburgh
21. **A Hardenability Test for Carburizing Steel**
    W. E. Jominy and A. L. Boegehold, General Motors Corp., Detroit
22. **Solubility of Copper in the Grain-Boundary Material of a Solid Solution of Copper in Zinc**
    G. R. Dean, Miner Laboratories, Chicago, and W. P. Davey, Pennsylvania State College, State College, Pa.
23. **The Rate of Austenite Transformation in Cast Iron**
    D. W. Murphy, W. P. Wood and D. Giradi, University of Michigan, Ann Arbor, Mich.
24. **Effects of Longitudinal Scratches on Valve Spring Wire**
    F. P. Zimmerli, Barnes-Gibson-Raymond, Detroit, W. P. Wood, University of Michigan, Ann Arbor, Mich., and G. D. Wilson, Barnes-Gibson-Raymond, Detroit
25. **Recovery of Cold-Worked Nickel on Annealing**
    Erich Fetz, Wilbur B. Driver Co., Newark, N. J.
26. **Metal Coloring**
    C. B. F. Young, Columbia University, New York City
27. **A Study of Deoxidation Type Inclusions in Alloy Steels**
    W. A. Hare and Gilbert Soler, Timken Roller Bearing Co., Canton, Ohio
28. **Some Problems in the Production of Low-Carbon Sheets in Non-Continuous Mills**
    M. L. Samuels and Alfred Boyles, Battelle Memorial Institute, Columbus, O.

The Behavior of Metals Under Impact

By A. W. Grosvenor

Assistant Professor of Mechanical Engineering
Drexel Institute of Technology
Philadelphia

This is the Third Lecture of the Philadelphia Chapter Course on "Metals — How They Behave in Service." The first and second lectures appeared in the May and June issues of THE REVIEW and subsequent issues will carry the others in this series of six.

IN THE first lecture of this series the speaker outlined the behavior of metals under steady load. In his talk he brought out several propositions that are important when we come to talk about impact. First is the fact that when metals are under load they are deformed, and up to a certain limit there is a proportionality between the amount of load applied and the amount of deformation. Also, after that limit of proportionality is exceeded, the amount of deformation increases faster than before, for given increments of stress or load, until the size of the bar is locally reduced in diameter. The deformation then increases at a rather rapid rate and finally the bar breaks.

Now we have wide ranges of properties of metals. Some metals break soon after they pass the elastic limit, with very little inelastic deformation. (Inelastic deformation is quite often called plastic. I don't quite like that term. I always think of plastic as being something like wax.) Other metals will deform inelastically a great deal.

Another thing we want to recall is the fact that metals deform by slip, or the sliding action of one part of the metal over another part, within the crystal boundaries. When actual cleavage (rupture of atomic bonds) begins, the metal will deform no farther.

Just how metals behave under shock conditions may not be so clear. First, I think there comes to mind the idea that metals are usually more brittle in shock. For example, suppose we are cutting off a rivet. If we were to take a plate, say, with a rivet in it and a good cold chisel and a machinist's hammer, and commence to cut that head off, I think we would all expect to see the head fly across the room if we didn't ease up toward the end. We feel, therefore, that metals must be more brittle under shock conditions. If we were to block a screw jack against the cold chisel and push the rivet off, certainly the head wouldn't fly off. Is it, then, that the metal is more brittle under shock, or is it simply that the blow of the hammer, or the shock that took off the rivet head imparted some velocity of motion to it?

Effect of Shock

Before we try to analyze the effect of shock on the metal, let's see what shock itself is. Suppose I were to place a 1-lb. weight on the head of some gentleman in the audience. I don't think it would affect him very much. But if I dropped the same weight out the window on him as he came in the doorway, I don't think he would be here now. In either case it is a 1-lb. weight, but there is a lot of difference in the damage it can do.

To get a measure of the effect of shock, it isn't sufficient to know what the weight is. We must know whether or not the weight was moving. Moving doesn't necessarily mean falling. That may simply be a cheap way of getting motion. And, of course, the farther the weight falls the faster it goes, to a certain limit. In the case of a falling body, all we need to do is to find the amount of damage that weight will produce when it stops. (You know it doesn't hurt you to fall; it is just when you stop falling that it hurts.) When the weight stops moving, and can give up to something else the energy acquired by moving, the amount of damage it will do is a product of its weight by the height in feet. This gives foot-pounds—a measure of available energy.

Suppose we take an automobile, for example, traveling 60 miles an hr. It isn't falling very much; yet it most certainly has the ability to do damage. We can convert the amount of energy to equivalent terms of a falling weight, but not by simply multiplying the weight by the speed. It so happens that what we are after is not the number of feet, or the height of fall, but the effect of the fall; for a moving object, we want to know the effect of its velocity. And we find — I am not going to bore you with mathematics — that the ability to do damage, or the energy of an object, is proportional to its weight and to the square of its velocity. That is, at 60 miles an hr., an automobile does four times as much damage as at 30 miles per hr., or, in other words, the energy is weight times velocity squared. If we want to convert this velocity to the equivalent height, we will have to divide by the rate at which gravity speeds things up, 32.2 ft. per sec. Thus, if we have an automobile traveling at a velocity of 60 miles per hr., or 88 ft. per sec., square 88 ft. per sec. and divide by two times the acceleration due to gravity, we find the energy equivalent to dropping the car from a height of 120 ft. It's a good thing to remember every time you come down the highway at 60 miles an hr. In other words, you might as well dump the car off a ten or twelve-story building and let it crash into another car.

Impact Imposes Stress

There is one more point before we come to the study of the metal itself. When a metal is subjected to impact, we find that impact often imposes more of a stress than we realize. Let's take a butcher's scale for example. We very carefully lay a 1-lb. weight on it, easing it down very gradually. Assuming that the butcher is honest, the scale will read 1 lb. But suppose we hold the weight just in contact with the platform, and suddenly let it go. The scale surges down and up a couple of times and finally comes to rest.

Why did it go down below the 1-lb. mark and then come up? Simply because until the material carries some load, it isn't much good. When we first put the 1-lb. load on the scales and let it down gradually, we are gradually applying a load, causing stress in the metal spring, which is gradually deforming in like amount. But if we put all the weight on at once, by the time the scale has swung down to the 1-lb. mark the weight has gained some velocity and it goes on by, and has to come back. Obviously, the momentary stress in the spring was greater than that caused by the slow application of the same weight. (This may be tried out experimentally by hanging a small weight such as a penknife on a rubber band.)

The difference between slowly and suddenly applying the load to the scales becomes apparent when we remember that in the first case we absorb half the energy of the moving weight, the scales taking the other half; in the second case, the entire energy must be absorbed by the scales. Simple demonstration of this sort will prove that the deflection under sudden application is twice that for slow application of the load. Hence, the stress set up in the deformed body is twice as great.

It is evident, then, that if we are to compare the behavior of metals under shock loads and static or steady loads, we must use the units of energy or work (foot-pounds), not merely the units of load (pounds). Often we blame metals for failing under shocks when, in reality, we have loaded them up far more than we realize. (It frequently happens that impact loads may also set up high velocity stress waves through a body.)

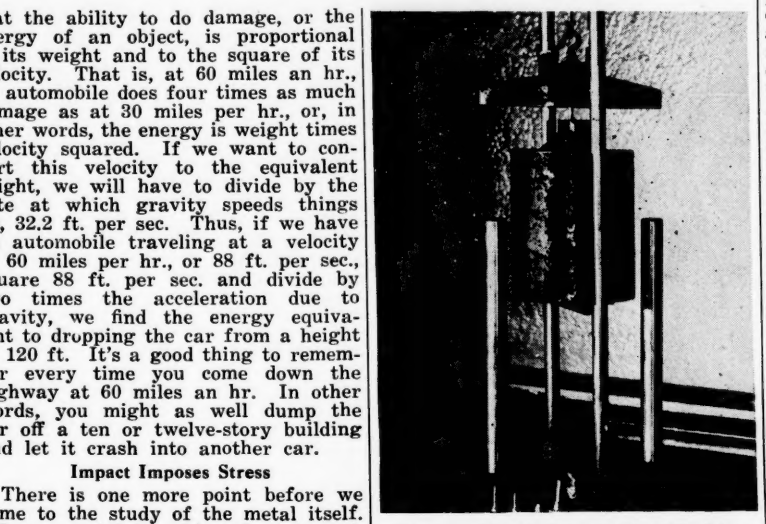

Fig. 2—Simple Impact Test Machine

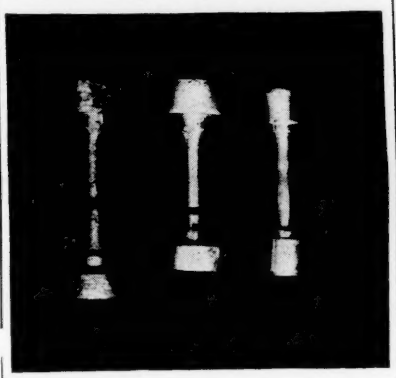

Fig. 3 — Results of Impact Test on Ductile, Strong and Tough Specimens

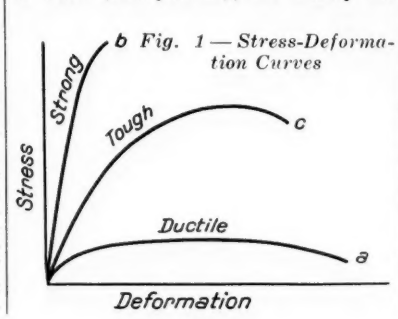

Fig. 1 — Stress-Deformation Curves

Evaluating Toughness

Let us refer to the stress-deformation diagram, discussed in the first lecture (Fig. 1). Such a diagram shows us the relationship between stress (measured in pounds per square inch) and deformation (measured in inches deformation per inch of length). As we have just seen, a force equivalent to the stress must move a distance equivalent to the deformation in order to change the shape of a piece of metal. We have, therefore, the dimensions of work, namely, force times distance, or inch-pounds.

Suppose we plot as a curve the results of a tensile test of a weak, ductile metal (Fig. 1, Curve *a*). Each addition of load produces an increment of stress; the product of the two represents the amount of work. The total work performed in deforming the test piece, up to the breaking point of the metal, is represented by the total area under the curve. In this case, the area is small, as one of the factors, strength, is low. A curve for a strong metal of low ductility is shown for comparison (Curve *b*). Again, the area is small; although the strength is much greater, the other factor, ductility, is low. Therefore, the most work is absorbed by a metal which has the greatest product of strength and ductility (Curve *c*). We say that such a metal is tough.

While the curves plotted from the data of tensile tests give us the relative toughness of metals, a direct impact test is probably more convincing. I have made up a small test bar of each of the metals represented in Fig. 1, and a rather crude machine (shades of the French Revolution!) in which to test their relative toughness by direct impact (Fig. 2). The test bars ($\frac{3}{16}$ in. diameter by 1 in. long) are shouldered at either end. We'll slip the lower shoulder of the first bar into a recess of the cylindrical weight (19 lb.); the upper shoulder we attach to a crossbar. As we carefully lower the whole assembly, the crossbar comes to rest on the two posts. The weight hangs free from the crossbar suspended by the test piece.

Let us now raise the assembly 8 in., by lifting the crossbar. The weakest test piece is strong enough to support the weight. From the standpoint of static conditions, then, the metal is not damaged. Let us now drop the assembly. It all falls as a unit until the crossbar strikes the two posts; the weight travels on, pulling the test bar in two. Under this dynamic condition, the metal is unsatisfactory. Upon examination, the two parts of the test piece can be seen to have elongated about 50%. But ductility alone is not sufficient for toughness; it merely tells us the metal is not brittle.

Upon testing the bar of strong but low-ductility metal (Curve *b*), we find it too is broken, but with almost no elongation. The third bar (Curve *c*) has not the strength of the second bar, nor the ductility of the first. Yet, when we test it, it remains unbroken, although it is elongated. (The bars are shown in Fig. 3). The work required to elongate it to its breaking point is greater than the 152 in-lb. (19 lb. × 8 in.) just expended on it. This bears out the results anticipated from the curves of tensile test data.

The impact test is ordinarily conducted by bending, rather than tension. The test bar is usually notched, presumably to confine the fracture to a limited volume of metal. Additional effects, however, are introduced by the notch, which place the notched bar tests in a separate classification.

Effect of Notch

The most evident effect of a notch is its restraining action on slip (the mechanism of inelastic deformation). To illustrate this point we may use as an example a bar tested in tension, or the tension side of a bend-test specimen. For the metal to elongate it must contract laterally. That is, as it gets longer, it must get thinner. Suppose, however, the bar has been notched. No tensile stress is transmitted across the notch, so there is no tendency for the metal on either side of the notch to elongate; hence it does not contract laterally. The metal below the notch, being under tensile stress, does elongate, and contracts laterally. Opposing its contraction is the "dead" metal on either side of the notch. This is schematically illustrated in Fig. 4. Figure 4-*a* represents a free portion of metal under the action of tensile stress; 4-*b* is an attempt to show the effect of the notch in restraining deformation.

An ordinary tensile test of a notched

(Continued on next page)

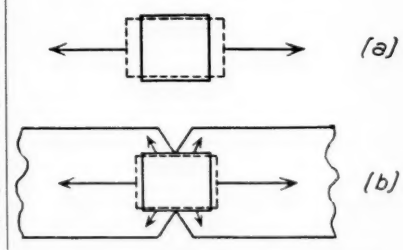

Fig. 4—Effect of Notch on Tensile Stress

Vas You Dere, Charlie?—Steel Treater

Fifteen years ago last March the American Society for Steel Treating held a sectional meeting in New York, at which the excellent group picture shown above was taken. When someone suggested that THE REVIEW publish this old photograph and attempt to identify the old-timers who were present at that meeting, we did not realize what a storm of controversy would be raised. Time has wrought many changes, and the result is that one name is credited to two different men, that one man's likeness gets three different names, and that Bradley Stoughton recognizes only his spectacles.

However, we are submitting the results of a very limited poll below, in which a few of the "old-timers" were asked to identify as many faces as possible. We make no claim to accuracy nor completeness in this list, and further identifications and suggestions will be welcomed. Address THE REVIEW, American Society for Metals, 7016 Euclid Ave., Cleveland.

1. T. D. Lynch; 2. R. M. Von Hofen; 3. Arthur W. F. Green; 4. G. J. Horvitz; 5. Henry Fischbeck; 6. S. N. Welch; 7. E. F. Cone; 8. R. L. Johnston; 9. R. J. Allen; 10. A. E. Van Cleve.

11. A. H. d'Arcambal; 12. Capt. Graham; 16. Mr. Toeplitz; 18. E. J.

(Continued from preceding page)

bar and of a plain bar whose diameter is equal to the root diameter of the notched bar will show a somewhat higher tensile strength for the notched bar, though, as may be expected, an elongation only a small fraction that of the plain bar. The work expended in rupturing the plain bar will be far greater. The little drop test we just performed proved that strength alone is not enough for toughness.

It is obvious that the notch-effect is a matter of undesirable stress distribution, and as such, something to be avoided so far as possible in design. But it is highly important to know whether or not all metals and alloys are affected equally by a notch.

Moser (TRANSACTIONS, American Society for Steel Treating, vol. 7, page 297), testing like samples of various metals, has shown that some metals propagate the notch readily, fracturing in a brittle manner, while in others the notch tends to widen more or less, so that a greater volume of metal is deformed (more work absorbed) before rupture takes place. This indicates a characteristic of the material itself, usually referred to as notch toughness, or conversely, notch sensitivity.

Slow Load Vs. Impact

Up to this point we have introduced no inherent difference between slowly applied loads and impact, so far as the metal itself is concerned. Petrenko (TRANSACTIONS, American Society for Steel Treating, vol. 8, page 519) ran a series of tests at the Bureau of Standards to make just such a comparison. He tested a number of materials by bending notched bars, both slowly and by impact. In both cases he reported the results in terms of energy absorption. Only one lot of material showed a marked difference, that is, a lower value, when tested by impact. This he attributed to an excessive amount of inclusions in the metal. It should be noted here that the impact tests were of the conventional type, in which the striking velocity is small compared to the velocity of sound (or stress propagation) through metal.

Kuntze (*Metallwirtschaft*, vol. 11, page 179) concludes from experimental work that the force required to rupture atomic bonds is raised greatly by deformation. According to his theory a notch, by restricting deformation, tends to keep rupture strength at a low value. (It should be noted that rupture strength of atomic bonds is not the same as our conventional tensile strength.) Here we have some grounds for anticipating a decrease in toughness under impact. Deformation or slip requires time; rupture of atomic bonds, when it occurs, is instantaneous. Slip, of course, ceases wherever atomic bonds are ruptured. It is conceivable that, with an impact of sufficient velocity, certain metals rupture before slip can take place; under a slower test a little slip might occur and raise the rupture strength, so that more slip could take place.

(For a critical abstract of the published work on notched-bar testing, see Hoyt's series on that subject in *Metals and Alloys*, Jan., Feb., April, May, 1936.)

High Velocity Impact

Very few data on high velocity impact were available prior to the work of Mann at Watertown Arsenal (*Proceedings*, American Society for Testing Materials, 1935, page 323; 1936, page 85). While some of his published results are for notched bars, most of them are for plain bars broken in tension. One of the most important points brought out is that materials as a rule have a constant toughness up to some critical velocity, with a rapid decrease at higher velocities. For some ma-

aters' Sectional Meeting 15 Years Ago

Janitzky; 19. Gerald Brophy; 20. Joseph V. Emmons.

21. Walter Mitchell; 22. W. H. Eisenman; 24. R. A. McDonald; 25. Homer Pardee; 26. A. H. Kingsbury; 29. R. J. Gebert; 30. George L. Norris.

31. John Crowley; 32. Someone now with the Navy Research Laboratory; 36. John A. Mathews; 37. A. E. White; 38. Alexander Gobus; 39. Henry Trumbore or Mr. Frankel (U. S. Steel); 40. F. M. Becket.

41. Harry Goodwill; 42. Ancel St. John; 43. De Corsey Browne; 44. Henry I. Moore; 45. Alfred P. Spooner; 47. Frank P. Gilligan; 48. Don Clark *(or Sam Tour's double — see No. 78);* 49. Robert M. Bird.

56. John Halbing; 58. J. S. Vanick *(see also No. 64);* 59. Ralph Angel; 60. L. R. Seidell.

61. Arthur Collins; 64. J. S. Vanick or H. R. Van Cleve *(see also No. 58);* 66. F. G. Hughes or Bill Hurt; 68. L. G. Nilson; 69. W. Leffler (Republic Steel); 70. T. N. Holden.

71. Mr. Smith *(you don't say!);* 76. W. F. Graham; 77. H. C. Poole; 78. Sam Tour *(see also No. 48);* 79. F. Cooper.

81. Richard Thorne; 82. JohnWyzalek; 83. C. W. Olsen; 84. Bill Steel or J. J. Thompson; 85. Bradley Stoughton *(who recognizes himself only by his spectacles — Someone else suggests* J. H. G. Williams); 86. B. H. DeLong; 87. Vic Heuber; 88. E. P. Kost.

91. Ed Edwards; 92. J. D. Andrews; 94. Mr. Reese; 95. Arthur Braid; 97. Doc Hoffman; 98. A. B. Kinzel; 99. John J. Crowe; 100. Irving Cowdrey.

101. G. E. Doan; 102. Mr. Rowland; 103. J. P. Jayme of Crucible, G. H. Clamer of Ajax, or Guilliaem Aertsen *(take your pick!);* 104. Mr. Ruppel (Firth-Sterling); 105. W. H. Plage; 106. Frank Hale; 107. John Rigney; 108. A. V. de Forest; 109. F. O'Connor.

115. W. A. Scheuch; 117. Mr. Hall; 118. Frank P. Fay.

terials the critical velocities are below 10 ft. per sec.; for others they are quite high. This may partly account for the frequent lack of confidence in the Charpy and Izod tests. One of the most striking results shows low critical velocity for either annealed or overheated steel, while for either normalized or properly quenched and drawn steel, the values are high.

A number of workers have investigated the effects of temperature on impact resistance of metals. (A subsequent lecture of this series will be devoted to the "Effect of High and Low Temperatures on Metals." In general, toughness is less at low temperature. The decrease is rather rapid for some alloys; quite often the drop begins at about average atmospheric temperature. A typical curve is shown in Fig. 5. This effect is of great importance in aircraft, oil dewaxing, refrigeration and air conditioning, to say nothing of equipment in cold climates.

Impact tests of all types have been the black sheep of physical testing. This is due partly to a confusion of the several factors, including notch sensitivity, temperature, velocity (all critical), partly to the difficulty of determining what portion of the volume of the test bar was involved in absorbing energy, partly to an uncertainty as

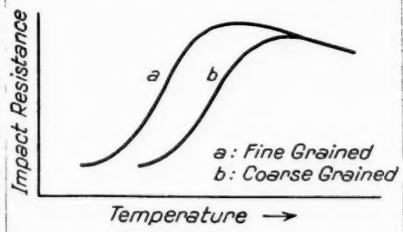

Fig. 5—Effect of Temperature on Impact Resistance

to how much energy the testing machine itself absorbed, and partly to the probability that stress waves of high velocity travel back and forth through both test bar and machine. It is little wonder, then, that designers find it practically impossible to use quantitative values of impact tests for design data.

Investigation Needed

On the other hand, the impact test, intelligently carried out, certainly has a place in the selection and rejection of metals for engineering purposes. The very sources of uncertainty listed above indicate behaviors of both metals and machines which show up so fully under no other conditions than impact. Rather than serving to condemn the test, these points should challenge the engineer to investigate further.

Metals in service are seldom stressed uniformly throughout, although we use the greatest of care in design to avoid notches, sharp corners, tool marks or other sharp changes of section. The first speaker pointed out the difference in physical properties of the several kinds of crystals in steel, cast iron and other alloys. Even like crystals vary in different directions. Inclusions act as internal notches. The ability of a metal to deform is therefore highly important, so that non-uniform stresses may be automatically readjusted, and rupture at low average stresses be prevented. On the other hand, the rupture strength must be high enough to prevent fracture before this desirable slip can occur.

The optimum combination of these two characteristics results in the property we commonly call toughness. It is the aim of the various notched bar and impact tests to measure this property under dynamic conditions, in order to weed out materials that would fail unexpectedly.

Suggestions to Chapter Speakers

A little booklet published by the Chicago Chapter of the Society containing suggestions for speakers who address chapter meetings contains so many excellent points applicable to all chapters of the Society that it is being reprinted here for the benefit of those members who will address A.S.M. meetings during the coming season. The procedure and equipment in Chicago are typical of most of the other chapters.

In the past years we have had frequent requests from speakers for information concerning the personnel of the Chicago Chapter, and the type of lecture which is most appreciated. We have been making a study of the attendance and the response of the Chapter members to various lectures during recent years, and as a result we have prepared this little pamphlet which we hope may give some valuable suggestions to future speakers.

We appreciate the difficulty, however, of making such suggestions as we realize that after all a great deal depends upon the personality of the individual speaker. Some men excel in presenting one type of a talk, while others may be more successful using an entirely different presentation.

These comments are presented, therefore, as merely tentative suggestions without any desire to dictate in any way to the speakers as to how they shall present their talks.

Personnel of the Chicago Chapter

The approximate division of membership in the Chicago Chapter along occupational lines is shown in the following table taken from a survey made in January, 1936.

Metallurgical & Chemical Engineers, Metallurgists, Chemists, Testers, and Metallographers ..	319
Engineers (other than above) ..	128
Presidents, Vice-Presidents, Secretaries, and Treasurers	66
Superintendents	41
General Managers, and Works Managers	19
Foremen	22
Salesmen and Sales Managers..	122
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From the above it is obvious that there is a great diversity of interests among our members. There is a similar diversity with regard to age, education, and experience. There are a number of very highly trained technical men among our membership, and there are also quite a large number who have not had any technical education.

Most Popular Type of Lecture

A study of the attendance records and the response of the audiences during recent years indicate that the Chapter members like to hear a discussion of a technical subject by an outstanding authority. At the same time they seem to appreciate a lecture which is worded simply enough to be within the understanding of the non-technically trained men.

The ideal lecture seems to be one which sends most of the members home with at least one and preferably three or four new ideas. Lectures which are so general or so elementary that they bring out no new ideas are not so popular. It may also be said that a lecture which is so far advanced that it is entirely new to the audience is difficult to follow.

Length of Lecture

The meetings of the Chicago Chapter are usually run very close to the schedule announced on the program. The dinner starts promptly and the speaker is introduced very nearly at the appointed time. It has been found advisable to close the meeting formally about 10:00 o'clock, as a great many of our members leave to catch suburban trains about that time. This means that the speaker can utilize about 45 minutes to one hour for his lecture and still leave ample time for discussion.

It is usually found that a fairly large group will stand around and discuss the lecture for a considerable time after the formal closing of the meeting.

Illustrations

The majority of speakers prefer to illustrate their lectures with lantern slides and some provide moving pictures. The Chapter will provide suitable equipment and a Union operator for the projection of either slides or moving pictures. The Program Committee would appreciate being advised in advance as to whether slides or motion picture films are to be presented. In the case of the latter, the size of the film should be stated. As our meeting room is fairly large, it is desirable that the slides should be easily readable from a distance.

In general, graphs or curves are preferable to tables. It has sometimes happened that a speaker has lost the interest of his audience by attempting to read long tables of data from the screen.

Meeting Place and Equipment

Although the acoustics of the Chicago Chapter meeting room are fairly good, the Chapter has found it advisable to provide a public address system. We believe that most speakers are sufficiently familiar with the use of the microphone, but for the few who are not it may be said that the best results are obtained by standing a little way back but facing the microphone, and talking distinctly in an ordinary tone. The operator will control the volume. The most common errors are getting too close to the microphone, and turning away from the microphone to face the screen. With the help of the illuminated pointer it is possible to point out anything on the screen without turning the head more than 90° with respect to the microphone.

The Chapter also provides a reading desk and an illuminated pointer. It projects the image of an arrow on the screen. With this equipment the lecturer can stand at the reading desk in front of the microphone and without moving can point out anything on the screen. This has been found to be of great convenience.

Reception of Speakers

The Program Committee is willing and anxious at all times to do anything in their power to see that the speaker is properly taken care of during his visit in Chicago. We would appreciate the speaker advising the program chairman of his arrival in the city. We want the speakers to feel they are our guests and to feel free to consider the Program Chairman an anxious host desiring to make their visit pleasant.

Course Announced

New Jersey Chapter to Have Eight Lectures on Tool Steels in Fall Based on Gill Course

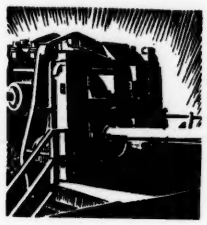
The Executive Committee of the New Jersey Chapter has decided to present an educational course beginning Monday, Oct. 4, according to John F. Wyzalek, Chairman of the Educational Committee of the Chapter. The course will be based on James P. Gill's course on "Tool Steels" presented during the National Metal Congress in 1934. Lectures No. 2 and No. 5, however, will be expanded so that the course will consist of eight lectures instead of five.

J. F. Wyzalek

Kropp Has New Machine Shop

The Kropp Forge Co., 5301 W. Roosevelt Road, Chicago, is adding a new building of 15,000 sq. ft. to house added machine shop facilities.

This building will be set apart from the hammer shop to allow for producing precision work, and will be completely tooled with modern high-speed machine tools for rough and finish machining of small and large forgings to 30 tons in weight.



The

Working of Metals

Authors

A. V. de Forest, Massachusetts Institute of Technology
S. L. Hoyt, A. O. Smith Corp.
C. L. Clark and A. E. White, University of Michigan
J. J. Kanter, Crane Co.
G. R. Brophy and E. R. Parker, General Electric Co.
M. F. Sayre, Union College
Owen W. Ellis, Ontario Research Foundation
N. P. Goss, Cold Metal Process Co.
Adam M. Steever, Columbia Tool Steel Co.
J. H. Friedman, National Machinery Co.
D. K. Crampton, Chase Brass and Copper Co.
Roy H. Smith, Lamson and Sessions Co.
J. E. Beck, Jones and Laughlin Steel Corp.
Horace C. Knerr, Consulting Metallurgical Engineer
Anson Hayes and R. S. Burns, American Rolling Mill Co.
Joseph Winlock and Ralph W. E. Leiter, Edward G. Budd Mfg. Co.
Norman E. Woldman, Eclipse Aviation Corp.

- Seventeen papers by the leading authorities in the metal world were presented at the two-day Symposium on Plastic Working held during the National Metal Congress last fall. For the first time these papers are all gathered together into one comprehensive volume.
- This Symposium was judged one of the most important ever held by the Society, and nowhere else can be found such a complete, compact, and up-to-date account of the subject of metal working.
- The book contains 469 pages and is bound in red cloth in the standard 6x9-in. size. Price is $5.00. Postpaid.

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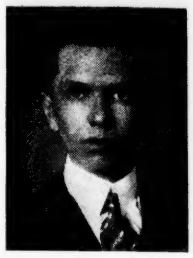
HERE AND THERE WITH A.S.M. MEMBERS

NEW JERSEY Chapter Secretary J. L. AUER has recently accepted the position of assistant works manager of R. Hoe & Co., Inc., New York, manufacturers of newspaper and magazine printing presses.



J. L. Auer

At the age of 28 he was appointed works manager of the De La Vergne Machine Co., New York, and maintained this same position when the company was merged with the I. P. Morris Co. of Philadelphia. From 1930 until he joined Hoe & Co., he was superintendent of the Crocker Wheeler Electric Mfg. Co., Ampere, N. J.

During the World War Mr. Auer served as a chief special mechanic in the Navy, being stationed at Brest, France, in charge of the naval repair unit shops.

* * *

E. C. BLACK, re-elected last spring as secretary-treasurer of the Los Angeles Chapter, has resigned as resident agent for the Midvale Co. and formed a new company with two of his associates, known as Tool Steels, Inc. They have been appointed representatives for the Tool Steel Division of Henry Disston & Sons, Inc. for the states of California and Arizona.

Mr. Black is also serving as secretary of the General Committee for the Western Metal Congress and Exposition, and reports a very enthusiastic outlook for the Committee's activities.

* * *

NEW SALES manager for the Eastern Division of the Wheelco Instruments Co. of Chicago is WILLIAM PRINTZ, 45 West 34th St., New York City.

Mr. Printz will be in charge of all sales along the Eastern Seaboard. He has been associated in the temperature control instrument field for the past 20 years.

* * *

CARL F. FLOE, newly elected chairman of the Notre Dame Chapter and assistant professor of metallurgy at Notre Dame University, is taking a two months' motor trip through Europe, visiting metallurgical plants and laboratories in Great Britain, France, Germany, Norway, and Sweden.

* * *

APPOINTED factory manager of the Columbus McKinnon Chain Corp. of Tonawanda, N. Y., OTTO W. WINTER has transferred from the Toledo Group, of which he is chairman, to the Buffalo Chapter of the Society.

O. W. Winter

Mr. Winter was formerly industrial engineer of the Kent-Owens Machine Co. of Toledo. He has also been general manager of the Cutter Division, Whitman and Barnes, Detroit; sales engineer for Cincinnati Milling Machine and Cincinnati Grinders, Inc.; and consultant to the Soviet Machine Tool & Cutting Tool Trusts in the U.S.S.R.

He is past chairman of the Detroit Chapter, a director of the American Society of Tool Engineers, and a member of the American Society of Mechanical Engineers.

Official Hangman

PAST-CHAIRMAN GORDON WEBB of the Detroit Chapter was elevated to the position of official hangman at the annual spring festival of the Chapter held June 12 at the Indianwood Country Club.

Gordon will probably protest that he was only preparing for the three-legged race, but his baleful expression belies any such peaceful motive for his length of rope.

Official photographer AL HERZIG was himself snapped while busily filming the boys at play. If his past results with a movie camera, particularly in color photography, are any criterion, the Detroit Chapter should get quite a treat when the films are shown at the fall meeting.

The third "candid camera" shot here reproduced shows the official photographer "unofficially" resting, while the hangman still looks for victims.

Official Photographer

Hangman, Photographer, and Two of the Boys Taking It Easy at the Detroit Chapter Spring Festival.

A GAPING hole is left in the ranks of the Cleveland Chapter with the transfer of A. ALLAN BATES to Pittsburgh, where he will be manager of the Chemical and Metallurgical Division of Westinghouse Research Laboratories. Dr. Bates, who was formerly professor of metallurgy at Case School of Applied Science, is vice-chairman of the Cleveland Chapter and has been a member of the Executive Committee for the past six or seven years.

A. A. Bates

His services to the National Society have been no less valuable. At present he is chairman of the Publication Committee and is the author of the lecture course on "Fundamentals of Ferrous Metallurgy" which has been one of the most popular courses used by A.S.M. chapters in their educational programs.

A graduate of Ohio Wesleyan University, Dr. Bates also attended Case School and the Ecole de Metallurgie, University of Nancy, France, from which he received his degree of doctor of science in metallurgy.

* * *

THE ROBERT TILLMAN Memorial Graduate Fellowship in Metallurgy has been conferred on PETER A. VUKMANIC, graduate student at Carnegie Institute of Technology and junior member of the Pittsburgh Chapter.

The fellowship, carrying with it a grant of $1200 a year, covers a period of three years' technical research and study.

Mr. Vukmanic will apply his efforts to various problems to be arranged and outlined by Carnegie Tech in collaboration with The Industrial Steel Casting Co. of Toledo, Ohio.

RECENT DEATHS

Jordan Korp

R. A. Bull

KNOWN to nearly all A.S.M. members through his popular chapter talk on hardening of tools is JORDAN KORP of Leeds & Northrup Co., charter member A.S.M., who died of a heart attack at his home in Philadelphia on August 10.

Mr. Korp was sent to the United States by the Norwegian Government in 1904 to study the machine and tool industry and further its development in Norway. This mission accomplished, he settled permanently in this country and took a position as tool maker for Leeds & Northrup Co. He has been intimately associated with the development of improved methods of hardening which resulted in the now well-known Hump method.

* * *

THE CHICAGO Chapter mourns the passing of an outstanding member and distinguished metallurgist, MAJOR ROBERT A. BULL. A widely known consultant on steel castings, Major Bull will ever be remembered for his efforts to better the Society in his specific field, for his willingness, his thoroughness and his optimism.

Major Bull received his education at Butler and St. Louis Universities. After serving as chief inspector and general foreman of several companies, he became manager of the order department of the American Steel Foundries. Later he became general superintendent for the Commonwealth Steel Co. and then vice-president and general manager of the Chicago Steel Foundry Co., positions which he later held with the Duquesne Steel Foundry Co.

In 1917 he was commissioned Major, Ordnance Department, U.S. Army. He was the author of many articles and papers on steel castings, and was awarded the Joseph S. Seaman Medal of the American Foundrymen's Association in 1927.

* * *

EDWIN H. FISHER, vice-president and treasurer of the Fisher Scientific Co. at Pittsburgh, and member of the Pittsburgh Chapter, died at the age of 51, on Saturday, July 3, of a heart attack following an appendicitis operation.

Mr. Fisher was well known among instrument makers and metallurgists and for many years he devoted his time and ability to devising instruments and apparatus for laboratories. He was particularly interested in the improvement of metallurgical equipment.

His formal training included prep school work at Shadyside Academy and a degree from Rensselaer Polytechnic Institute.

Laboratory Cyclone Is Built by Lindberg

A small, inexpensive laboratory furnace built on the same principle as the production type of Cyclone furnace has been developed by Lindberg Engineering Co., Chicago.

This furnace has a work chamber 8 in. in diameter by 10 in. deep, and is provided with a plug type cover which is easily lifted off for inserting the load.

The electric heating elements are mounted in a separate chamber, thereby eliminating all direct radiation to the charge. A powerful blower fan circulates the heated air through the work chamber, insuring rapid, uniform heating.

The furnace is sturdily constructed of heavy steel plates, reinforced with structural angles which extend to the floor, forming the base and supporting the furnace at convenient working height. Efficient slab insulation keeps heat loss at a minimum throughout the temperature range up to 1250° F.

This laboratory Cyclone serves as an accurate and inexpensive pilot furnace for checking up on production, or for pre-determining the response to specified heat treatments, as well as for tempering small tools and individual steel parts.

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Steel Handbook
A veritable handbook is Jessop Steel Co.'s catalog of carbon, tool, stainless and other alloy steels. Descriptions are supplemented by instructions for forging and heat treatment, and diagrams and charts of physical properties. Bulletin Ha-61.

Arc Welding Future
Harnischfeger Corp. takes a look at the future of arc welding in a booklet stressing the simplicity of "Smootharc" welders. Illustrated with a wealth of photographs, drawings and cross-sections. Bulletin Ha-171.

Physical Properties
A chart giving the approximate average physical, chemical and mechanical properties of standard steels in common use should be an extremely useful reference sheet. Central Steel & Wire Co. publishes it. Bulletin R-168.

Stainless Slide Chart
Carpenter Steel Co.'s pocket-size slide chart gives at a glance the technical data on all stainless steels. Bulletin Jy-12.

Juthe Pot Furnace
Juthe gas-fired pot furnaces are designed for drawing, hardening, liquid carburizing, and reheating. The cylindrical type, Model GP, is fully described and standard sizes given in a leaflet by American Electric Furnace Co. Bulletin Ha-2.

Alloyland
Reprints of "Alice in Alloyland," the whimsical, cleverly written little parody of Lewis Carroll's classic published in METAL PROGRESS, have been prepared by Electro Metallurgical Co. and are available for distribution. Bulletin Ha-16.

Flowmeters
Flowmeters patented by American Gas Furnace Co. measure the entire flow of air or gas, thus permitting exact control of gas burning operations and carburizing. The principle, installation and uses are described in Bulletin Ha-11.

Staybolts
With higher speeds, greater loads, and increasing boiler pressures, locomotive staybolts have a tough job these days. Information on Bethlehem Steel Co.s Mayari staybolt steel should therefore be of interest. Bulletin Ha-76.

Hy-Speed Case
50 to 500% increase in the life of high speed steel tools is claimed in a striking and interesting new booklet just published by the A. F. Holden Co. Typical cases of these savings are cited. Bulletin Fa-55.

Testing Equipment
Fully illustrated, complete with charts, curves and other technical data, containing 48 pages, and in two colors throughout, the new Testing Machine Bulletin issued by the Baldwin-Southwark Corp. containing a comprehensive description of the well-known Southwark-Emery line of equipment should be a valuable addition to any library. Bulletin Ha-67.

Sawing and Cutting
"The Do-All Digest" is an interesting little publication of the Continental Machine Specialties, Inc., giving pertinent facts about the Do-All line of cutting machines. It is illustrated, showing examples of work done. Bulletin Ha-170.

Small Pyrometers
Because of their low price and easy installation, Wheelco Instrument Co.'s small indicating pyrometers may be used wherever temperatures need checking. Described in Bulletin Ha-110.

Magnet Steels
A very handsome booklet describes the permanent magnet steels and castings made by Simonds Saw & Steel Co., including Alnico and Alnic. Bulletin Ba-158.

Dental Metallurgy
A unique publication by International Nickel Co. details information on mechanical properties, heat treatment and working instructions for the platinum-palladium-gold alloys extensively used in dentistry. 36 pages; large size. Bulletin Ha-45.

Tooling Costs
Why shielded arc welding is ideal for tooling is told in "A Guide to Lower Tooling Costs With Shielded Arc Welded Steel Jigs and Fixtures," published by Lincoln Electric Co. Typical welded steel jigs and fixtures are illustrated and described. Bulletin Ha-10.

Annealing Practice
A very well printed and bound booklet by Surface Combustion Corp. is unique in that it illustrates both by photographs and blueprints six different forms of radiant tube annealing covers for sheet, strip, rod and wire. Manufacture of the prepared atmosphere is also described. Bulletin Ha-51.

Defi Rust
Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Metallograph
Leitz Large Micro-Metallograph "MM-1"—most interesting 36-page publication containing numerous photomicrographs on the very latest developments in metallographic equipment. Special attention is given to darkfield illumination. Bulletin Ha-47.

Grinding Carbides
A complete and detailed treatise on this important problem has been issued by the Carborundum Co. Special wheels and grits for the various commercial grades of carbides are given and many practical pointers are included. Bulletin Nv-57.

Photoelectric Balance
C. J. Tagliabue Mfg. Co. has christened its newest, simplest and fastest recording potentiometer the "Celectray" from the photocell, electric current and light ray by means of which it operates. Described in Bulletin Ea-62.

Spoilage Fear
Fear of spoilage, says C. I. Hayes, Inc., may cost a firm more than actual tool loss through spoilage in the furnace. How "certain curtain" furnace eliminates spoilage and spoilage fear is told in Bulletin Aa-15.

Protection Tubes
The advantages of a die cast over a sand cast pyrometer protection tube are described and illustrated by Driver-Harris Co. Stock sizes of Nichrome protection tubes are listed. Bulletin Ga-19.

Metals for Corrosion
Fourteen varieties of Midvaloy corrosion and heat resisting metals are described in a detailed bulletin by The Midvale Co. Properties and applications are listed and illustrated. Bulletin Ca-160.

Cleaning Processes
An attractive 12-page booklet entitled "Scientific Metal Cleaning" has been published by Detroit Rex Products Co. It describes in detail the applications and advantages of Detrex degreasing with Perm-A-Clor or Triad Safety Solvents and the applications of Triad Alkali Cleaning Compounds and Strippers. Bulletin Oy-111.

Tube Furnaces
The uses, construction, control and operation of combustion tube furnaces are given in a folder by Hevi Duty Electric Co. which includes complete specifications for various types. Bulletin Aa-44.

Testing Machines
An extremely handsome, spiral-bound, segregated catalog tells all about the various hydraulic and screw power testing machines made by Tinius Olsen Testing Machine Co. Bulletin Oy-147.

Hardening Furnaces
P. D. M. high speed hardening furnaces are described in two bulletins by The Philadelphia Drying Machine Co.—one devoted to oil-fired and one to gas-fired furnaces, both made in single and twin chamber models. Details of construction, design features and tables of sizes and capacities are included. Bulletin Oy-150.

Globar Elements
Globar electrical heating units and a variety of accessories for their operation have been cataloged by Globar Division of Carborundum Co. Bulletin Oy-25.

Hot Work Steel
A new "Blue Sheet" by Ludlum Steel Co. gives physical properties, comprehensive test data and recommendations for heat treating Atlas A hot work steel, a tough, shock resistant tungsten steel. Bulletin Fa-94.

Bolts and Nuts
The calorizing process of driving aluminum into the surface of steel and the physical properties of bolts and nuts made from calite alloys are described in a folder by the Calorizing Co. Bulletin Fa-26.

Oxidation
Designers confronted with oxidation problems connected with cracking coils, polymerization plants, superheaters, high pressure steam plants, air heating equipment and recuperators will welcome a folder by Timken Roller Bearing Co. containing data on oxidation at 1000, 1250 and 1500° F. Bulletin Ea-71.

X-Ray Examination
The application of X-ray examination and inspection of castings, welding, and food products, as well as practical X-ray crystal analysis, is completely described and strikingly illustrated in General Electric X-Ray Corp.'s new 34-page publication. Bulletin Dy-6.

Alloy Castings
Michiana Products Corp. has published a new book describing Michiana corrosion resistant and stainless steel alloys. Generously illustrated, it suggests many savings for the use of these alloys. Bulletin Oy-81.

Firebrick
Babcock & Wilcox make an insulating firebrick which is refractory as well as insulating and can be used without a facing of firebrick. Description, applications, and engineering data are contained in Bulletin Fy-75.

Metal Heating
Improvements in furnace economies, operating conditions and appearance, furnaces that will more satisfactorily meet old requirements or handle new processes, service that will help solve the most stubborn problems are offered and described by Mahr Mfg. Co. in Bulletin Ea-5.

Meehanite
A compact but complete specification chart gives the recommended grades of Meehanite metal for various service requirements. Complete physical properties and applications are included. Bulletin Da-165.

Mesh Products
Wire mesh is a class of material about which little is heard. A folder by C. O. Jelliff, therefore, telling the special alloys and metals used, styles and weaves and applications, is of unique interest. Bulletin Da-78.

Alloy Steels
Why alloy steels are best for heavy equipment and other exacting applications is discussed in a folder by Bliss & Laughlin, Inc. A partial list of the more common grades gives machine ratings and turning speeds. Bulletin Jy-42.

Cutting Steel
Recommended practices for gas cutting of structural steel are given in a concise and authoritative form by The Linde Air Products Co. Qualification tests for good workmanship from the standpoint of accuracy and smoothness of cuts are also described. Bulletin Dc-63.

Heat Treating
A folder by Industrial Heating Equipment Co. explains and illustrates diagrammatically a continuous type of heat treating furnace in which temperatures can be held to within extremely close limits, and in which the product is always uniformly heated. Bulletin Ga-168.

Sheet Metal Guide
If you work with sheet metal you will be sure to want this 63-page booklet by United States Steel Corp. It is chock-full of helpful hints and useful practical information on galvanized, black, terne, and stainless steel sheet. Bulletin Ga-79.

Optical Aids
Bausch & Lomb's new catalog lists and describes the instruments and accessories that are especially useful in the metal working industries, such as the toolmakers' microscope, the wide field binocular, the shop microscope, and the Brinell microscope. Bulletin Ga-35.

New Joining Process
Metal parts are joined cheaply, neatly and strongly by Electric Furnaces Co.'s new, inexpensive non-oxidizing furnace atmosphere and their new, continuous brazing, coppering and soldering furnaces. Full details are given in Bulletin Ar-30.

Hump Hardening
All three vital factors in correct hardening are completely controlled by the new Vapocarb Hump method of hardening, which is well described in a Leeds & Northrup bulletin. The three factors are: Quench point, rate of heating, and furnace atmosphere. Complete details are given in Bulletin No-46.

Chapmanizing
Chapmanizing, the new method of surface hardening steel with nitrogen, is described in a very attractive booklet of Chapman Valve Mfg. Co. Information is given out on the method itself and on its metallurgical advantages. Bulletin Ob-80.

Thermit Welding
Metal & Thermit Corp. offers a new booklet showing all the possibilities of Thermit welding, explaining the action, and telling in detail how representative Thermit welds can best be made. Well illustrated and clearly written. Bulletin Ar-64.

Pyrometer Accuracy
A thought-provoking folder of Hoskins Mfg. Company explains how the use of Chromel-Alumel for pyrometer lead-wires makes it possible to take full advantage of modern pyrometric instruments. Bulletin Ob-24.

Grinding Lubrication
A handy outline for the selection of grinding wheels is one of the useful features of a booklet full of facts about grinding solutions. D. A. Stuart & Co. Bulletin My-118.

Vanadium Facts
Revived after nearly 20 years is the house organ of Vanadium Corp. of America, "Vanadium Facts." This paper shows considerable thought and care in its preparation and contains valuable and interesting information on vanadium steels. Bulletin Ox-27.

Electric Salt Baths
Literature is available from Bellis Heat Treating Co. describing electrically heated bath furnaces which are economical to operate and have a wide range of applications in hardening, annealing, and heat treatment of high speed steel, stainless steel, nickel, aluminum, copper and bronze, etc. Bulletin Ny-48.

Tempering Furnace
Technical details and operating data on Lindberg Steel Treating Co.'s new Cyclone electric tempering furnace, which has shown a remarkable performance record in steel treating operations, are given in Bulletin Fx-66.

Metal Surfaces
A manual giving in detail methods for the application of sodium cyanide solutions in the preparation of metal surfaces is announced by the R. & H. Chemicals Department, E. I. du Pont de Nemours & Co. Bulletin Ba-29.

Blast Cleaning
So many changes have taken place in blast cleaning and dust collecting equipment in the past three years that Pangborn Corporation's "quick reference" catalog of condensed information will be invaluable to all those interested in this subject. Bulletin Jy-68.

Chain
Interesting information on chain and belt conveyors for use at high temperature may be had by sending for a new illustrated bulletin by Michigan Steel Casting Co. Bulletin Dy-84.

Heat Treating Manual
A folder of Chicago Flexible Shaft Co. contains conveniently arranged information on heat treating equipment for schools, laboratories and shops, and also illustrates the several types of Stewart industrial furnaces. Bulletin Ar-49.

Refractory Blocks
Light-weight, low heat storage insulating refractory blocks known as "Insulblox" for reducing heat storage and radiation losses at operating temperatures up to 2200° F. are described in a folder by Quigley Co. Bulletin Ea-139.

Testing with Monotron
Shore Instrument & Mfg. Co. offers a new bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Je-33.

Alcoa Notes
"Alcoa Random Notes" is the intriguing title of a little monthly paper got out by Aluminum Co. of America. A request for this bulletin will bring you a copy of the latest issue. Bulletin Ca-54.

Corrugated Ingots
The Gathmann Engineering Co. has published a new booklet called "Gathmann Ingot Molds—Their Purpose and Design." It illustrates various corrugated ingot contours designed to produce defect-free surface in steel ingots. Bulletin Ay-13.

Moly Matrix
Climax Molybdenum Co.'s little monthly newspaper contains many interesting and informative articles. Get the latest issue—Bulletin Ax-4.

Copper Bulletin
A new clearing house for news of developments in brass, bronze, and copper, the "Copper Alloy Bulletin," issued by the Bridgeport Brass Co., made its appearance with the March issue. It is edited for the technical and engineering audience. Bulletin Da-163.

Turbo-Compressors
Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Stainless Data Book
All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc. giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Laboratory Service
A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Nickel-Copper Steels
Exceptional resistance to corrosion and abrasion, increased tensile strength, and higher ductility are the qualities claimed for Youngstown Sheet & Tube Co.'s new series of Yoloy steels. A summary of properties and notes on their characteristics are contained in Bulletin Ox-93.

Photo-Electric Cells
If you are not familiar with the wide field of applications for photo-electric cells and apparatus, send for this very interesting and complete booklet by Pfaltz & Bauer, Inc. covering the original apparatus developed by Dr. Bruno Lange. Bulletin Ca-142.

EPI Microscope
The Zeiss EPI microscope for the illumination and observation of opaque material has unlimited applications for observing opaque material in dark field, bright field, and polarized light. A descriptive leaflet is published by Carl Zeiss, Inc. Bulletin Aa-28.

Port Valves
Diagrams and descriptive matter show the operation of adjustable port valves made by North American Mfg. Co. that are particularly suitable for mediums whose rate of flow is not constant. Bulletin Oy-138.

Newer Tool Steels
Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jy-127.

Ni-Cr Castings
Compositions, properties, and uses of the high nickel chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

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Jy-12	Ha-110	Ea-62	Oy-25	Da-165	Ob-80	Ar-49	D-17
Ha-2	Ba-158	Aa-15	Fa-94	Da-78	Ar-64	Ea-139	Ox-93
Ha-16	Ha-45	Ga-19	Fa-26	Jy-42	Ob-24	Je-33	Ca-142
Ha-11	Ha-10	Ca-160	Ea-71	Dc-63	My-118	Ca-54	Aa-28
Ha-76	Ha-51	Oy-111	Dy-6	Ga-168	Ox-27	Ay-13	Oy-138
				Ga-79	Ny-48	Ax-4	Jy-127
					Fx-66	Da-163	Fx-32

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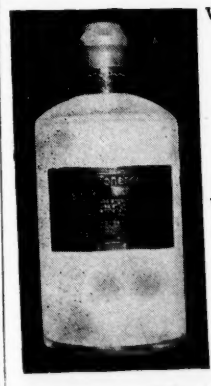

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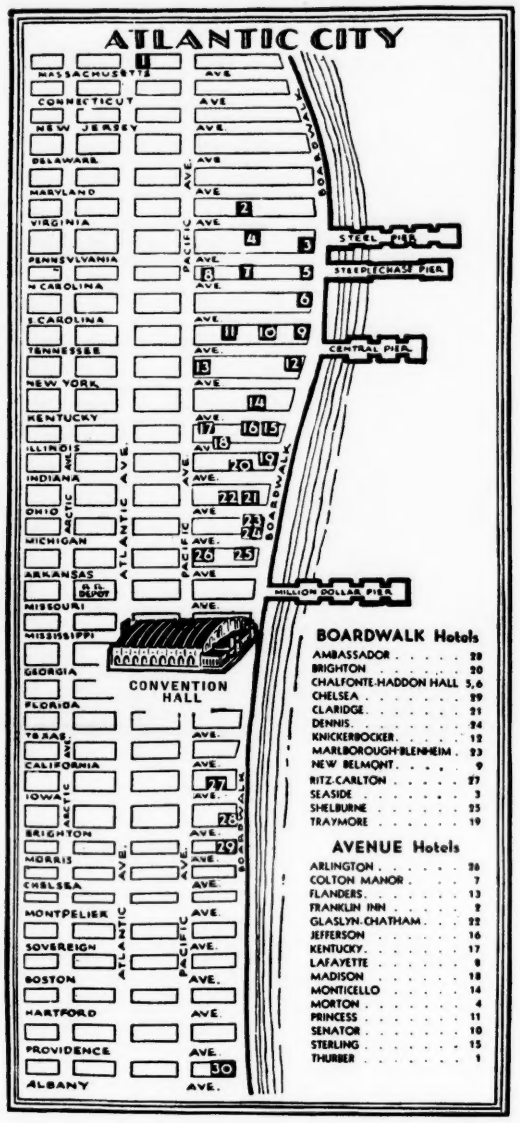
ATLANTIC CITY

October 18 to 22, 1937



HOTEL RESERVATIONS

● It is urged that your hotel reservations for the 19th Annual Convention of the A.S.M. be sent in at once so that you may be assured of the accommodations you desire. The Ambassador Hotel will be headquarters for the A.S.M. Below appears a list of the Boardwalk and Avenue Hotels with rates for one and two persons. All reservations are to be cleared through the local committee on Hotels, and it is suggested that you use the coupon at the bottom of the page addressing it to the Hotel Committee Chairman, Wm. B. Coleman. It will be noted that during the National Metal Congress and Exposition special convention rates are in effect which are much lower than the usual summer rates.

SCHEDULE OF RATES
ALL ROOMS WITH BATH

	— European Plan — ROOM For 1 Person	ROOM For 2 Persons	Additional Charge for Each Person for Three Meals
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*AMBASSADOR, Boardwalk at Brighton Ave.	$3.00-$6.00	$6.00-$10.00	$4.00
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CHALFONTE-HADDON HALL, Boardwalk at N. Carolina Ave.	3.00- 8.00	6.00- 10.00	3.50
CHELSEA, Boardwalk at Morris Ave.	3.00- 5.00	5.00- 8.00	3.00
CLARIDGE, Boardwalk at Park Pl.	4.00- 9.00	6.00- 11.00	4.00
DENNIS, Boardwalk at Michigan Ave.	3.50- 6.00	6.00- 10.00	3.00
KNICKERBOCKER, Boardwalk at Tennessee Ave.	3.00- 4.00	5.00- 7.00	3.00
MARLBOROUGH-BLENHEIM, Boardwalk at Ohio Ave.	4.00- 6.00	6.00- 11.00	3.00
NEW BELMONT, Boardwalk at Ocean Ave.	2.50- 3.00	4.00- 6.00	E. P. Only
**RITZ-CARLTON, Boardwalk at Iowa Ave.	3.00- 6.00	6.00- 10.00	3.00
SEASIDE, Boardwalk at Penna. Ave.	3.00- 4.00	5.00- 6.00	3.00
SHELBURNE, Boardwalk at Michigan Ave.	4.00- 6.00	6.00- 8.00	E. P. Only
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ARLINGTON, 116 S. Michigan Ave.	3.50- 4.00	5.00- 6.00	2.00
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FLANDERS, 127 St. James Place	3.00- 4.00	5.00-	2.00
FRANKLIN INN, 157 S. Virginia	2.50-	4.00-	2.00
GLASLYN-CHATHAM, Park Pl.		5.00-	2.00
JEFFERSON, 136 S. Kentucky Ave.	3.00- 3.50	5.00- 6.00	2.50
KENTUCKY, 126 S. Kentucky Ave.	2.50-	4.00-	E. P. Only
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MADISON, 123 S. Illinois Ave.	3.00- 4.00	5.00- 7.00	2.50
MONTICELLO, 131 S. Kentucky Ave.		5.00-	2.00
MORTON, 150 S. Virginia Ave.	2.50- 3.50	4.00- 6.00	2.50
PRINCESS, 144 S. So. Carolina Ave.	2.50-	4.00-	2.00
SENATOR, 166 S. So. Carolina Ave.	3.00- 4.00	5.00- 7.00	2.50
STERLING, 144 S. Kentucky Ave.	2.50- 3.00	4.00- 5.00	2.00
THURBUR, Atlantic and Mass. Aves.	2.50-	4.00-	E. P. Only

*Headquarters—A.S.M. & Wire Ass. **Headquarters—A.I.M.E. ***Headquarters—A.W.S.

William B. Coleman, Chairman Committee on Hotels
16 Central Pier, Atlantic City, New Jersey

Please reserve AS FIRST CHOICE HOTEL.....
AS SECOND CHOICE HOTEL.....
AS THIRD CHOICE HOTEL.....

☐ Single Room ☐ Double Room **Rates**.....

These accommodations to be for the period October 18-22, or for such other period as may be indicated herein as follows:

Arriving on October.....**AT**.....**A.M.**.....**P.M.**

NAME .....

ADDRESS .....

CITY .....**STATE** .....

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